Shieldalloy Metallurgical Corporation Superfund Site

Newfield, Gloucester/Cumberland Counties, New Jersey

Superfund Proposed Plan *June 2014*

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes remedial alternatives considered for Operable Unit Two (OU2) at the Shieldalloy Metallurgical Superfund site and identifies the preferred remedial alternative along with the rationale for this preference.

This Proposed Plan was developed by the U.S. Environmental Protection Agency (EPA), the lead agency for the site, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency. The EPA is issuing this document as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA) and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The nature and extent of the contamination in OU2 of the site and the remedial alternatives summarized in this Proposed Plan are described in detail in two documents: the April 2013 remedial investigation (RI) report and May 2014 feasibility study (FS) report. These and other documents are part of the publicly available administrative record file. The EPA encourages the public to review these reports to gain a more comprehensive understanding of OU2 of the site and the Superfund activities that have been conducted at the site.

OU2 addresses soil, surface water and sediment at the site, including the Shieldalloy Metallurgical Corporation (SMC) facility and the Hudson Branch of the Maurice River, with the exception of the contaminant perchlorate, which will be addressed in a subsequent phase of the site cleanup.

The preferred alternative incorporates and builds upon earlier cleanup actions at the site. For the facility soil, the preferred alternative includes capping the remaining uncapped areas and implementing institutional controls, such as a deed notice, to prohibit residential use of the facility. For the Hudson Branch, the preferred alternative includes excavating and disposing of sediments that present an unacceptable risk to the environment and restoring the excavated areas. The estimated present-worth cost of the preferred alternative is $5,310,000.

MARK YOUR CALENDAR

Public Comment Period:

June 27 to July 26, 2014

EPA will accept written comments on the Proposed Plan during the public comment period. Written comments should be addressed to:

Sherrel Henry Remedial Project Manager
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Public Meeting

EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held as follows:

Newfield Borough Hall
18 Catawba Avenue, Newfield, NJ
July 9, 2014 at 7:00 pm

COMMUNITY ROLE IN SELECTION PROCESS

This Proposed Plan is being issued to inform the public of the EPA's preferred alternative and to solicit public comments pertaining to all of the remedial alternatives evaluated, including the preferred alternative. Changes to the preferred alternative, or a change from the preferred alternative to another alternative, may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. The final decision regarding the selected remedy will be made after the EPA has taken into consideration all public comments. The EPA is soliciting public comments on all of the alternatives considered in the Proposed Plan, because the EPA may select a remedy other than the preferred alternative. This Proposed Plan has been made available to the public for a public comment period that concludes on July 27, 2014.

A public meeting will be held during the comment period to provide information regarding the investigations of OU2, the alternatives considered and the preferred alternative, as well as to receive public comments. The public meeting will include a formal presentation by EPA of the preferred alternative and other cleanup options for OU2.

Information on the public meeting and submitting written comments can be found in the "Mark Your Calendar" text box on Page 1.

Comments received at the public meeting, as well as written comments received during the comment period, will be documented in the Responsiveness Summary section of the Record of Decision (ROD). The ROD is the document that explains which alternative has been selected and the basis for the selection of the remedy.

SCOPE AND ROLE OF ACTION

The site is divided into three operable units. Operable Unit 1 (OU1) consists of the non-perchlorate contamination in the groundwater at the site. NJDEP issued a ROD for OU1 in 1996, with EPA's concurrence. OU1 is in the long-term operation and maintenance phase.

OU2, which is the subject of this Proposed Plan, consists of the non-perchlorate contamination in the soil, surface water and sediment. The main contaminants of concern for OU2 are chromium and vanadium in soil and sediment.

OU3 consists of the perchlorate contamination in any medium (groundwater, soil, surface water, sediment, air etc.) and is in the remedial investigation/feasibility study phase. Perchlorate is a naturally occurring and synthetically-made chemical that is used to produce rocket fuel, fireworks, flares and explosives. SMC used perchlorate in some of its manufacturing processes at the site. Remediation was originally separated into perchlorate and non-perchlorate segments by NJDEP, with concurrence from EPA. A remedy for OU3 is expected to be the final action for the site.

Radiological contamination in the "restricted area" on the SMC facility is not part of the Superfund site and is being addressed by NJDEP, as authorized by the U.S. Nuclear Regulatory Commission (NRC). The restricted area is surrounded by a chain link fence with barbed wire and is posted with specific signage. Inside the perimeter fence is a long-term storage area with slags and dusts containing low levels of radioactive isotopes generated during past facility operations. Further information about the environmental response actions to address the restricted area is available from NJDEP.

This Proposed Plan identifies the proposed final remedy for OU2, which will be finalized in an OU2 ROD following consideration of the comments received during the public comment period.

SITE BACKGROUND

Site Description

The site comprises two parcels, the "SMC facility" and the "farm parcel," and the Hudson Branch, an intermittent stream that discharges into Burnt Mill Pond (see Figure 1). Site investigations also included neighboring properties to the two site parcels and Burnt Mill Pond.

SMC Facility The larger parcel is the 67.5-acre SMC facility located at 35 South West Boulevard, in the Borough of Newfield, Gloucester County, New Jersey with a small portion of the southwestern corner located in the City of Vineland, Cumberland County, New Jersey. The facility is currently used by SMC as office space. Portions are also leased by SMC to various construction companies and to Newfield Borough for warehousing. The facility is secured by a locked perimeter chain link fence. The facility is bordered to the north by a rail spur and an inactive landfill; to the east by a wooded area, residences and small businesses; to the south by residences located along Weymouth Road; and to the west by Conrail rail lines, South West Boulevard, and various light industries and residences.

The SMC facility consists of four main areas, the *former production area, former lagoons area, eastern storage area and southern area*, as well as the *natural resource restoration areas* (see Figure 2).

The *former production area* is approximately 22 acres and is the area where the majority of manufacturing activities occurred. This area is largely covered with buildings and asphalt or concrete pavement. A Stage II cultural resources survey was prepared for an on-site structure, the Specialty Glass Corporation Melting Tank, in compliance with the National Historic Preservation Act, which concluded that no cultural features of significance exist near OU2.

The *former lagoons area* occupies 4.5 acres. It includes nine lagoons that stored wastewaters and were closed by SMC between 1994 and 1997, with NJDEP oversight. The former lagoons area is covered by a clean soil cover and light vegetation, which includes small trees and grass.

The *eastern storage area* had been used to store drums containing by-products of the manufacturing processes. A 1.3-acre portion of the eastern storage area is uncapped and covered with some gravel and concrete debris.

The *southern area* includes undeveloped areas, the on-site impoundment and the former thermal pond area. The on-site impoundment receives a combination of facility storm water and treated water from the on-site groundwater treatment system pursuant to New Jersey Pollutant Discharge Elimination System (NJPDES) permit requirements. The water from the on-site impoundment is directed into a ditch flowing toward the Hudson Branch. The on-site impoundment was installed by SMC in the early 2000s by excavating existing soils. The former thermal pond area covers 0.77 acres and consists of a rectangular depression, approximately three to five feet deep, that is covered with vegetation including grass and small trees. During facility operations, the former thermal pond was used as an emergency holding reservoir for treated wastewater. Several areas were developed and included in the natural resource restoration areas (discussed below). The remainder of the southern area is undeveloped and covered with a vegetated cap, grass and small trees.

The *natural resource restoration areas* are located in a non-contiguous collection of areas around the facility, generally focused on the eastern and southern areas and total nearly 10 acres (see Figure 2). These areas are the subject of a Settlement Agreement of Environmental Claims and Issues by and between SMC and the United States of America (on behalf of the EPA) and the State of New Jersey (on behalf of NJDEP). In 1999 and 2000, caps comprised of clean soil and vegetation, including a variety of grass, flowers, trees and bushes, were constructed in these areas. These vegetative caps provide habitat value and eliminate the potential for exposure to contaminated soil.

Farm Parcel The smaller farm parcel is 19.8 acres of noncontiguous farmland in the City of Vineland approximately 2,000 feet southwest of the facility. The farm parcel is used for groundwater remediation under OU1. The farm parcel has never been used for manufacturing activities. It is considered part of the site because it is land that is needed to implement the OU1 remedy.

Hudson Branch The Hudson Branch, an intermittent stream, runs along the southern edge of the facility and discharges to Burnt Mill Pond. A small "pond area" exists on the Hudson Branch

where water velocity slows and sediments accumulate.

The SMC facility and farm parcel are zoned industrial. The future land use of the site is anticipated to remain consistent with its current zoning. The site is located in a mixed residential, agricultural, commercial, and light industrial area. The closest residences are approximately 100 feet south of the facility. Burnt Mill Pond could be used for recreational purposes. Groundwater is the primary source of drinking water in the area.

Site History

Specialty glass manufacturing began at the facility in the early 1900s. Shieldalloy Metallurgical Corporation purchased the facility in the early 1950s. From 1955 to 2006, SMC manufactured specialty steel and super alloy additives, primary aluminum master alloys, metal carbides, powdered metals and optical surfacing products at the facility. Production processes also included chromium metal, chromium oxide, vanadium pentoxide, ferro-vanadium, uranium oxide, thorium oxide, ferro-columbium and columbium nickel. General facility operations, product spills and wastewater discharges contributed to the contamination of the site.

Chromium contamination of the groundwater was first detected by NJDEP in 1970 in a Borough of Newfield municipal well and a private well. As a result, NJDEP directed SMC to perform groundwater investigations to determine the extent of the chromium contamination and to develop an appropriate remedial action. SMC purchased the farm parcel in 1970 to construct a groundwater extraction and treatment system. In 1979, SMC began pumping and treating chromium-contaminated groundwater.

In September, 1983, the SMC site was proposed for inclusion on the National Priorities List pursuant to Superfund law. The site was added to the NPL in September 1984.
In 1991, SMC completed a remedial investigation. The remedial investigation indicated that the groundwater, soil, surface water and sediments were contaminated with volatile organic compounds (VOCs) and metals. Supplemental remedial investigation activities were conducted in 1995 to delineate the extent of contamination. A feasibility study report was completed in 1996.

In September 1996, the NJDEP issued a ROD for OU1 with EPA concurrence. The selected remedy includes modification of the existing groundwater remediation treatment system to optimize the capture of contaminated groundwater, air stripping to remove VOCs from the groundwater, electrochemical treatment with supplemental treatment methods, as needed, to remove inorganic contaminants, especially metals, and discharge of the treated groundwater to the surface waters of Hudson Branch. This remedy is ongoing and pilot studies are underway to evaluate ways to enhance the remediation of the groundwater contamination, consistent with the OU1 remedy.

Enforcement History

The NJDEP was the lead agency for the site until 2010 when the lead was transferred to the EPA. In 1984, NJDEP and SMC entered into an administrative consent order requiring SMC to investigate groundwater at the site and to address the plume of groundwater contamination. In 1986, NJDEP directed SMC to modify and upgrade its groundwater extraction and treatment system and to expand the groundwater monitoring program. In 1988, NJDEP and SMC signed a second administrative consent order requiring SMC to upgrade the groundwater extraction and treatment system, to perform a site-wide study of the soil, and to close nine surface impoundments. At NJDEP's direction, SMC also took a number of response actions that resulted in the excavation of the lagoons, the removal of above-ground and underground storage tanks, and the capping of the industrial areas of the site. Nearly all the developed portions of the site were eventually capped, except the eastern storage area. In 2006, TRC Environmental Corporation (TRC) executed a contract with SMC that ensures the existing building/paving and vegetative caps are maintained and that an appropriate deed notice would be implemented. Also in 2006, NJDEP entered into an administrative consent order with SMC and TRC for the completion of all Superfund cleanup activities at the site.

The EPA entered into administrative order on consent (2010 Administrative Order) with SMC and TRC in April 2010 to perform activities for OU2, which is the subject of this Proposed Plan. Under the requirements of the 2010 Administrative Order, SMC and TRC conducted supplemental studies into the nature and extent of the non-perchlorate contamination in the soil, surface water and sediment and conducted feasibility studies of remedial alternatives. The 2010 Administrative Order also requires TRC and SMC to perform response activities in connection with OU1 and OU3. For OU1, the 2010 Administrative Order requires the continued performance of an appropriate (non-perchlorate) groundwater remedy. For OU3, the 2010 Administrative Order requires the completion of an RI/FS to address perchlorate at the site.

SITE CHARACTERISTICS

Site Geology and Hydrology

Three surficial geologic units underlie the site: the Bridgeton Formation, Cohansey Formation and Kirkwood Formation. The Bridgeton Formation consists of up to 28 feet of brown sand. Below the Bridgeton Formation is the Cohansey Formation, which consists of coarse sands and little silt in the upper 40 feet and generally finer sand and some clay and silt lenses in the lower 60 to 80 feet. Below the Cohansey Formation is the Kirkwood Formation, which consists of a vertically confining gray clay and silt layer that was encountered at the site at 121 to 153 feet below ground surface. The thickness of the unsaturated soils ranges from a few feet near the Hudson Branch to 17 feet in the northern part of the site. Bedrock was not encountered during site investigations but is estimated at approximately 2,000 feet below ground surface.

Surface water bodies at the site include the on-site impoundment, Hudson Branch and associated wetlands, and Burnt Mill Pond. The on-site impoundment is located near the southwest corner of the facility and receives facility storm water and treated water from the onsite groundwater treatment system. There are two permitted outfalls related to the on-site impoundment that discharge to Hudson Branch.

The Hudson Branch is a small losing stream that discharges to groundwater and Burnt Pond; it originates just to the southeast of the facility and flows west/southwest. Near the facility, the Hudson Branch is relatively dry during much of the year but can be as deep as three and a half feet during rain events. The channel of the Hudson Branch is generally one to three feet wide, although along the southern boundary of the facility the branch becomes broader, expanding from 20 feet to as much as 100 feet wide. Downstream of the facility, the Hudson Branch flows southwesterly via culverts under South West Boulevard, Weymouth Road, Arbor Avenue, and North West Avenue before discharging into Burnt Mill Pond. The small "pond area" of the Hudson Branch is less than half an acre and located near the corner of North West Avenue and Arbor Street.

Wetlands were delineated on the upper Hudson Branch, ranging from approximately five feet wide along the facility boundary to more than 400 feet wide near the southwest corner of the facility. At a number of points along Hudson Branch, the wetland vegetation consists of phragmites, which is an invasive plant species generally considered to provide low quality habitat. Higher quality, native wetlands vegetation includes overstory red maple, pin oak, sweet gum, black willow, green ash and white ash, and understory species dominated by ferns.

Burnt Mill Pond, a man-made waterbody, is located approximately one and a quarter miles southwest of the facility and receives discharge from Hudson Branch. Burnt Mill Pond encompasses 15 acres when full and is impounded by a dam. In 2011, the NJDEP's dam safety group indicated that the dam presented threat of failure and directed the City of Vineland (the owner of the pond) to drain the pond and study the dam.

RESULTS OF THE REMEDIAL INVESTIGATION

The remedial investigation/feasibility study for OU2 incorporated the prior studies documenting contamination at the site and the prior remedial actions taken. The main supplemental RI tasks included collection and analysis of surface and

subsurface soil samples, collection and analysis of surface water and sediment samples, and development of a risk assessment for OU2. The OU2 supplemental remedial investigation activities were conducted in October 2011 and January 2012. The remedial investigation is documented in the April 2013 remedial investigation report.

Soil

One hundred ninety-six surface and subsurface soil samples were collected from the facility between 1990 and 2012. Soil samples were collected across all site areas. Because earlier response actions included the removal of contaminated soils from lagoon areas and the capping of developed portions of the facility, RI/FS sampling included a mixture of confirmatory sampling (to demonstrate that these actions were sufficient) and sampling in areas where no previous response measures had been taken. The soil samples were analyzed for VOCs, semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs) and metals. The analytical results for the soil samples were screened against the more stringent (lower) of the New Jersey non-residential direct contact soil remediation standards (NRDCSRS) and the EPA regional screening levels (RSLs).

The values for hexavalent chromium are the NRDCSRS of 20 milligrams per kilogram (mg/kg) and the RSL of 5.6 mg/kg. Detections of hexavalent chromium were screened against the more stringent value of 5.6 mg/kg. Hexavalent chromium was detected in 28 of 196 soil samples at levels greater than 5.6 mg/kg. The highest hexavalent chromium detected was 58.3 mg/kg in a sample collected from a lagoon in 1995. The highest concentration detected during the supplemental remedial investigation in 2011-2012 was 24 mg/kg in a sample collected in the former production area.

The values for vanadium are the NRDCSRS of 1,100 mg/kg and the RSL of 5,100 mg/kg. Detections of vanadium were screened against the more stringent value of 1,100 mg/kg. Vanadium was detected in 18 of 182 soil samples at levels greater than 1,100 mg/kg. The highest vanadium concentration detected was 12,100 mg/kg in a sample collected in the southern area.

The values for arsenic are the NRDCSRS of 19 mg/kg and the RSL of 2.4 mg/kg. Detections of arsenic were screened against the more stringent value of 2.4 mg/kg. Arsenic was detected in two out of 193 samples at concentrations at levels greater than 2.4 mg/kg. Arsenic was detected at 43.1 mg/kg and 69.8 mg/kg, in samples collected from the former production area in 1995. Arsenic was also detected in the background samples at concentrations ranging from 2.4 to 6.8 mg/kg.

VOCs were not detected in any of the 196 soil samples above the more stringent of the NRDCSRS or RLS for each VOC.

The values for benzo(a)pyrene are the NRDCSRS of 0.2 mg/kg and the RSL of 21 mg/kg. Detections of benzo (a) pyrene were screened against the more stringent value of 0.2 mg/kg. Benzo(a)pyrene was detected in only one of 48 soil samples collected at the facility above 0.2 mg/kg, at a concentration of 0.42 mg/kg from a sample collected from the former production area in 1990. In 1995, a second sample collected from the same location yielded results below the NRDCSRS, so it was determined that the first result was a false positive. Therefore, benzo(a)pyrene was not analyzed further during the remedial investigation.

Total PCBs were detected in only one of 64 samples collected at the facility above the NRDCSRS of 1.0 mg/kg. Total PCBs were measured in a sample collected from the eastern storage areas at 3.4 mg/kg in 1990. Due to the low frequency of detection and the relatively low concentration, PCBs were not evaluated further during the remedial investigation.

Pesticides were detected in four of 49 soil samples collected at the facility above the NRDCSRSs. The pesticides were detected in a sample collected from the former production area and two samples collected from the eastern storage areas in 1990. Samples were collected from these same locations in 1995 and pesticides were not detected. Due to the low frequency of detection and the more recent

non-detections, pesticides were not evaluated further during the remedial investigation.

Facility Soils: Impact to Groundwater

Non-perchlorate contamination in groundwater is being addressed by OU1. The potential for OU2 soils to act as a continuing source of groundwater contamination was evaluated as part of the OU2 remedial investigation by comparing facility soils data to NJDEP Impact to Groundwater (IGW) values for ten metals: arsenic, cadmium, lead, mercury, silver, beryllium, nickel, manganese, aluminum and antimony. The comparison indicates that the concentrations of five metals in facility soils (arsenic, cadmium, lead, mercury and silver) are not adversely impacting groundwater. The comparison of the remaining five metals (beryllium, nickel, manganese, aluminum and antimony) indicates that these metals may be affecting groundwater locally near the facility; however, data collected at the site upgradient of the farm parcel shows that concentrations in groundwater of four of the five metals (beryllium, nickel, manganese and aluminum) are below screening levels.

The remaining metal, antimony, exceeded NJDEP's IGW value in some samples. Accordingly, the OU2 remedial investigation evaluated the potential for antimony in soil to act as a source of local groundwater contamination. The remedial investigation found that elevated levels of antimony in soil are not associated with elevated levels of antimony in groundwater, suggesting that natural soil constituents such as iron and aluminum oxide are assisting in the natural attenuation of antimony.

The metal vanadium does not have an NJDEP IGW value; however, the potential for vanadium to migrate through soil and into groundwater was also evaluated, due to the presence of vanadium in site soils and elevated concentrations of vanadium historically detected in groundwater in localized areas beneath the facility. In recent sampling data, however, shallow groundwater immediately downgradient of the facility showed that vanadium was either not detected or was present at concentrations that are below the EPA tap water screening levels for vanadium compounds. This indicates that vanadium attenuates to health-based levels in groundwater.

Further, because VOCs were not detected in facility soils, it was concluded that OU2 soils are no longer impacting VOCs in groundwater. Therefore, the potential impacts to groundwater from metals and VOCs were not evaluated further in the remedial investigation.

In summary, there is little evidence that metals contamination in soils acts as a continuing source of contamination to groundwater. Vanadium, beryllium, nickel, manganese, aluminum, and antimony will be monitored as part of the OU1 remedy to confirm that they naturally attenuate in groundwater.

Surface Water and Sediment

On-Site Impoundment

Surface water samples are collected on a monthly basis as part of the on-site groundwater treatment system. The data showed no exceedances of either the 2009 EPA National Recommended Water Quality Criteria or the 2006 EPA Region III Biological Technical Assistance Group Freshwater Screening Benchmarks. These values are risk-based and have been developed to screen contaminants for both human and ecological receptors. Therefore, surface water in the impoundment was not evaluated further in the remedial investigation.
Six sediment samples were collected from the on-site impoundment to evaluate the sediment conditions in this area. The samples collected were analyzed for SVOCs, pesticides, PCBs, metals, total organic carbon (TOC), particle size and pH. The results were compared to the New Jersey ecological screening criteria (ESCs). PCBs were detected in two sediment samples exceeding the ESCs. Metals detected above the ESCs included arsenic, chromium, iron, lead and nickel. Chromium had the highest percent of detections above the ESC.

Hudson Branch

The Hudson Branch is classified by NJDEP as Fresh Water 2 (FW2). The designated uses of

FW2 surface waters include maintenance, migration and propagation of the natural and established biota; primary contact recreation; industrial and agricultural water supply; and public potable water supply after conventional filtration treatment and disinfection. In addition to the FW2 classification, the Hudson Branch is designated as non-trout waters (NT). These waters are generally not suitable for trout because of their physical, chemical or biological characteristics, but are suitable for a wide variety of other fish species.

During the supplemental remedial investigation, surface water and sediment samples were collected from locations along seven transect lines perpendicular to the Hudson Branch. Samples were analyzed for VOCs and metals, including hexavalent chromium. The concentrations were considerably lower than those detected during previous investigations, indicating that the early response actions (capping and excavating the lagoons) have addressed much of the on-site contamination that acted as a continuing source to surface water. Surface water sample results were compared to the New Jersey Surface Water Quality Standards (SWQS). No VOCs were detected in the surface water samples. Iron and vanadium were detected in surface water at concentrations exceeding the SWQS and above concentrations in background samples. Iron appears to be naturally occurring in the area.

A total of 26 sediment samples were collected at several depths. In general, the shallow sediment samples were collected from the top six inches below the water-sediment interface, while deeper samples were collected from the depth intervals of 1.5 to 2.0 feet and 2.5 to 3.0 feet. SVOCs, pesticides, PCBs and metals were detected in the shallow depths at concentrations exceeding the ESCs. Chromium had the highest percent of detections above its ESC, although other metals were detected in shallow sediment samples exceeded their respective ESCs including antimony, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel and zinc. SVOCs, pesticides, PCBs and metals were detected in the deeper horizons at concentrations exceeding the ESCs. Contaminant concentrations decrease significantly with depth. Sediment sampling in the small "pond area" showed detections of chromium, nickel and vanadium at concentrations exceeding the ESCs.

Burnt Mill Pond

Four surface water samples were collected and analyzed from the Burnt Mill Pond prior to its draining by the City of Vineland. Aluminum, iron, manganese and vanadium were detected in three of the four surface water samples at concentrations exceeding the SWQS. The historical and recent OU2 supplemental remedial investigation data show that concentrations of metals in surface water samples have decreased significantly in the Burnt Mill Pond.

Four sediment samples (top six inches) were collected from Burnt Mill Pond prior to draining. Chromium, copper, manganese, mercury and nickel were detected in all sediment samples collected from the Burnt Mill Pond at concentrations exceeding the ESCs.

SITE RISKS

The human health risk assessment (HHRA) for OU2 evaluated potential current/future risks to recreational trespassers, an on-site worker and an on-site construction/utility worker. The cancer risks and noncancer health hazards were evaluated for the reasonably maximally exposed individual, which is the maximum exposure that is reasonably estimated to occur at a site and not a worst-case scenario. Fencing limits access to the facility by recreational users but is not considered in the HHRA. Previous response actions that resulted in capping of most of the developed areas of the site and are being maintained as part of agreements with SMC were assumed to be in place. The reasonably anticipated future land use for the site is the same as the current commercial/industrial land use. An ecological risk assessment for OU2, comprised of a screening level ecological risk assessment and a baseline ecological risk assessment (BERA), was conducted to assess the risks posed to ecological receptors in terrestrial and aquatic habitats.

Human Health Risk Assessment

A four-step human health risk assessment process was used for assessing site-related cancer risks and noncancer health hazards. The four-step process is comprised of: Hazard Identification of Chemicals of Potential Concern (COPCs), Exposure Assessment, Toxicity Assessment and Risk Characterization (see text box, "What Is Risk and How Is It Calculated?").

The HHRA evaluated the potential human health risks to 1) a recreational trespasser exposed to facility surface soils, sediments in the on-site impoundment, Hudson Branch, and Burnt Mill Pond, and surface water in Hudson Branch and Burnt Mill Pond, 2) an on-site worker exposed to on-site surface soils, and 3) a construction/utility worker exposed to surface soils and subsurface soils.

The cancer risks for the recreational trespasser and the on-site worker fall within the EPA target risk range of 10^{-6} to 10^{-4} and the noncancer hazard indices (HIs) are less than the EPA reference level of 1. The cancer risk for the construction/utility worker also falls within the EPA target risk range of 10^{-6} to 10^{-4}. The noncancer HI for the future construction worker is 2, slightly above the EPA reference level of 1, primarily based on inhalation of vanadium in fugitive dust.

Baseline Ecological Risk Assessment

The BERA evaluated site risks to ecological receptors in the terrestrial habitats in the uncapped areas of the facility (eastern storage areas) and in the habitats of Hudson Branch and Burnt Mill Pond. The BERA evaluated potential risks to the following ecological receptors: short-tailed shrew, American robin, muskrat, mallard, tree swallow, little brown bat, and American robin. Hazard quotients (HQs) were calculated for each receptor and compared to the EPA's reference level of 1. HQs above 1 indicate the potential for ecological risk.

In the surface soils in the eastern storage areas of the facility, the BERA found unacceptable risks to the short-tailed shrew and American robin. For the

WHAT IS RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current and future land uses. A four-step process is utilized to assess site-related human health risks for reasonable maximum exposure (RME) scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at a site in various media (*e.g.,* soil, surface water, and sediment) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a reasonable maximum exposure scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment*:* In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a one-in-ten-thousand excess cancer risk; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a threshold level (measured as an HI of less than 1) exists below which non-cancer health effects are not expected to occur.

short-tailed shrew, the mean concentrations of chromium and vanadium resulted in HQs of 2 and 4, respectively. For the American robin, the mean concentrations of chromium and vanadium in surface soil resulted in HQs of 4 and 19, respectively.

In the Hudson Branch sediments, the BERA found unacceptable risks to the short-tailed shrew, American robin, tree swallow, little brown bat, muskrat, mallard and aquatic invertebrates. For the short-tailed shrew, the mean concentrations of chromium resulted in an HQ of 3. For the American robin, the mean concentrations of chromium and vanadium resulted in HQs of 4 and 16, respectively. For the tree swallow, the mean concentrations of chromium and vanadium resulted in HQs of 8 and 82, respectively. For the little brown bat, the mean concentrations of chromium and vanadium resulted in HQs of 2 and 7, respectively. For the muskrat, the mean concentration of chromium resulted in an HQ of 2. For the mallard, the mean concentration of chromium resulted in an HQ of 3. Risks to aquatic invertebrates, such as reduced survival and reproduction, were found to be above acceptable levels for chromium, copper, lead, nickel and vanadium based on sediment toxicity testing and elevated contaminant concentrations. No unacceptable ecological risks were found relative to the surface water of Hudson Branch.

Risk Characterization

The HHRA concluded that cancer risks and noncancer health hazards for facility soils were acceptable for all scenarios except the future construction/utility worker receptor, which had an HI of 2 due to vanadium in the eastern storage area. These risk assumptions are based upon the continued presence of capping and land-use controls on the facility property; were the caps not in place, other unacceptable exposures may occur. For informational purposes, the HI for a potential future child resident living on the facility was calculated at 4; note that residential use is not considered a reasonably anticipated future land use for OU2.
The BERA concluded that the calculated ecological risk was above the EPA's acceptable level for facility soils in the eastern storage areas, with the risk driven by vanadium and chromium. In the Hudson Branch, the BERA concluded that ecological risk exists where sediment concentrations of chromium, vanadium, copper, lead and nickel are above the PRGs for possible effects to aquatic organisms within certain portions of the Hudson Branch (see Figure 3). These metals are co-located, with chromium identified as the indicator contaminant due to its relatively high concentrations and frequency of detection. The chromium impact is approximately 5 acres and 8,200 cubic yards. The majority of chromium in the Hudson Branch, up to 99 percent, exists between a former wastewater discharge point on the facility and the farm parcel. The small "pond area" on the Hudson Branch also may be affected.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives are specific goals to protect human health and the environment. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered standards and guidance and site-specific risk-based levels. The following remedial action objectives (RAOs) have been developed to the address the contamination found in the SMC facility soils and the Hudson Branch sediments and surface water at the site:

- Prevent human exposure to contaminated surface soils in the eastern storage area of the SMC facility that pose an unacceptable noncancer health hazard;
- Prevent exposure to contaminated surface soils in the eastern storage area of the SMC facility that pose an unacceptable ecological risk; and
- Prevent exposure to contaminated sediments in Hudson Branch that pose an unacceptable ecological risk.

Furthermore, protectiveness at the site is dependent upon the ongoing maintenance of capped areas on the SMC facility.

REMEDIATION GOALS

The remediation goals for contaminated surface soil in the eastern storage area of the facility and Hudson Branch sediment were developed specifically to protect human health and the environment and thereby address the unacceptable risks identified in the HHRA and the BERA. Based on the results of the BERA and HHRA, preliminary remediation goals (PRGs) were developed for surface soil at the eastern storage areas and sediments associated with the Hudson Branch.

Facility Soil in Eastern Storage Areas	
Contaminant	**PRG (mg/kg)**
Total chromium	44
Hexavalent chromium	20
Vanadium	54

Hudson Branch Sediment	
Contaminant	**PRG (mg/kg)**
Total Chromium	1,275
Vanadium	574
Copper	223
Lead	203
Nickel	107

Although vanadium was detected in surface water samples at concentrations exceeding the SWQS, no unacceptable ecological risk was found. Given that the highest vanadium concentrations in surface water are co-located with the highest concentrations of vanadium in sediment, it is anticipated that addressing the vanadium-contaminated sediment will reduce the levels of vanadium in surface water such that the SWQS is met.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that remedial actions be protective of human health and the environment, cost-effective, comply with ARARs and utilize permanent solutions, alternative treatment technologies and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which employ, as a principal element, treatment to reduce the volume, toxicity or mobility of the hazardous substances, pollutants and contaminants at a site permanently and significantly. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

The guidelines and requirements established in the National Contingency Plan (NCP, 40 CFR 300.430) are also considered in the development of alternatives. The EPA has recognized that at certain sites, the use of treatment technologies and the development of a wide range of remedial options may not be practicable.

Principal threat wastes are source materials that include or contain hazardous substances that act as a reservoir for the migration of contamination to groundwater, surface water or air, or act as a source for direct exposure. These materials are considered to be highly toxic or highly mobile and, generally, cannot be reliably contained. At this site, principal threat waste was present in the lagoons and was removed in 1994-1997. Therefore, the remedial alternatives developed for the site focused on alternatives that address the low-level threats posed by the contaminated facility soils and Hudson Branch sediments.

The process used to develop and screen appropriate technologies and alternatives to address OU2 contamination in the facility soils and Hudson Branch sediments can be found in the feasibility study report. The initial screening was based on effectiveness, implementability (technical and administrative) and relative cost. The technologies that were carried forward after the initial screening are engineering/institutional controls such as a deed notice; monitoring; capping; excavation; and treatment. These suitable technologies were assembled into four alternatives representing a range of options for remediation of OU2. Each alternative considers both the facility soils in the eastern storage area and the sediments in Hudson Branch:

Alternative 1: No Action
Alternative 2: Institutional Controls (ICs) and Monitoring
Alternative 3: Capping Facility Soils, Excavating Sediments and ICs
Alternative 4: Excavating Facility Soils, Excavating Sediments and ICs

Alternative 1: No Action

Capital cost	$0
Operation & Maintenance (O&M) cost	$0
Present-worth cost	$0
Construction time	0 months

The Superfund program requires that a no action alternative be considered as a baseline for comparison with the other remedial alternatives. The no action alternative does not include any physical remedial measures that address the contamination at the site. Under the no action alternative, no institutional controls would be implemented to ensure that the perimeter fencing and capped areas at the facility would be maintained, therefore, no measures would be in place to prevent unacceptable exposure to contaminated surface soils in the eastern storage area or contaminated sediments in Hudson Branch.

Because Alternative 1 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, as required by CERCLA.

Alternative 2: Institutional Controls and Monitoring

Capital cost	$150,000
O&M cost	$490,000
Present-worth cost:	$640,000
Construction time:	3 months

Alternative 2 includes institutional controls to address all areas that have contaminants posing unacceptable risks from facility soils and/or exceeding the New Jersey Residential Direct Contact Soil Remediation Standards (N.J.A.C. 7:26D), which are used to determine the need for a deed notice or other land-use restriction. Alternative 2 also incorporates the existing capping of facility soils and fencing around the facility. The risks posed by contaminated sediments at Hudson Branch would be addressed by monitoring of naturally occurring processes that reduce the toxicity, mobility and volume of the contaminants. Under Alternative 2, no further active remediation or treatment of contaminated facility soils in the eastern storage areas or Hudson Branch sediments would be conducted to prevent potential human or ecological exposure.

Institutional Controls, in the form of deed notices, restrictive covenants, and/or local ordinances, would be implemented to prohibit future residential development of facility soils and would ensure that all existing covers and fencing are maintained. For example, should a building be removed, the former building footprint would be paved to maintain existing cover/cap. In addition, if subsurface work is anticipated, the deed notice would require a management plan for workers involved in handling contaminated sediments or facility soils. The deed notice would comply with New Jersey Administrative Code 7:26C-7.2, which is an ARAR. The management plan would require use of appropriate personal protective equipment and proper handling and disposal of contaminated sediments or soils, and would include appropriate inspection and maintenance of engineering controls such as fencing and capping.

Monitoring/Long Term Monitoring – Naturally occurring processes can reduce the toxicity, mobility and volume of the contaminants in sediment. Natural occurring processes may include biodegradation, biotransformation, diffusion, dilution, adsorption, volatilization, chemical reaction or destruction, resuspension, downstream transport and burial by cleaner material. The reduced sediment concentrations over time indicates that some or all of the natural processes mentioned above may be occurring. A detailed monitoring plan would be developed and implemented. Monitoring could include regular inspections with sediment, surface water and plant sampling to confirm that the remedy is achieving the RAOs.

Because Alternative 2 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, as required by CERCLA.

Alternative 3: Capping Facility Soils, Excavating Sediments and Institutional Controls

Capital cost	$4,900,000
O&M cost	$410,000
Present-worth cost:	$5,310,000
Construction time:	24 months

Alternative 3 includes capping of uncapped facility soils in the eastern storage areas to address the unacceptable risks posed by contaminated soils. The existing capping of facility soils and fencing around the facility would be incorporated and ICs would be implemented, as described in Alternative 2. The contaminated sediments at Hudson Branch would be excavated to eliminate the unacceptable ecological risk to a depth of 12 inches in the channel and six inches outside the channel.

Soil Capping- A cap would be placed over the 1.3-acre area to prevent direct contact with vanadium/chromium-impacted facility soils. Cap material would be selected during the design after assessing the appropriateness of a permeable or impermeable cap for long-term performance of the remedy. For cost-estimating purposes in the FS, the cap was assumed to a 12- to 24-inch thick gravel cap, or will be a cap consisting of six inches of gravel and two inches of asphalt.

Hudson Branch Sediment Excavation – Approximately 9,800 cubic yards of Hudson Branch sediments that contain metals at concentrations that present a risk to ecological receptors would be excavated, treated (dewatered) and disposed at a permitted off-site disposal location. Excavated areas would be backfilled approximately to pre-existing grades and restored with appropriate fill (the top six inches will be topsoil) and appropriate erosion protective matting, where applicable. Vanadium concentrations in surface water are co-located with the highest concentrations of vanadium in sediment and it is anticipated that addressing the sediment will reduce the surface water concentrations to the NJDEP surface water quality standard of 12 micrograms/liter (ug/L). Additional sampling will be conducted in the small "pond area" during the pre-design stage to determine if sediment in that localized area is above the PRGs and should be excavated to protect ecological receptors. The volume of sediment to be excavated, if any, would be small (estimated 400 to 500 of the total 9,800 cubic yards estimated). Remedial design criteria for excavation of sediment in Hudson Branch will incorporate preservation of large trees, to the extent practicable, to promote sustainability and habitat preservation.

Because Alternative 3 would result in contaminants remaining above levels that allow for unrestricted use and unlimited exposure, a review of site conditions would be conducted at least once every five years, as required by CERCLA.

Alternative 4: Excavating Facility Soils, Excavating Sediments and Institutional Controls

Capital cost	$10,670,000
O&M cost	$410,000
Present-worth cost:	$11,080,000
Construction time:	36 months

Alternative 4 includes excavation of facility soils in the eastern storage areas to address the unacceptable risks posed by OU2. The existing capping of facility soils and fencing around the facility would be incorporated and ICs would be implemented, as described in Alternative 2.

Soils Excavation - Approximately 21,000 cubic yards of facility soils would be excavated, treated as necessary to allow for off-site disposal, and transported to a permitted off-site disposal facility. The depth of excavation would be approximately ten feet. The excavated areas would be backfilled and restored with clean soil and gravel to match the surrounding grade and vegetation.

THE NINE SUPERFUND EVALUATION CRITERIA

1. **Overall Protection of Human Health and the Environment** evaluates whether an alternative eliminates, reduces, or controls threats to public health risk assessment is an analysis of the potential adverse health and the environment through institutional controls, engineering controls, or treatment.

2. ***Compliance with Applicable or Relevant and Appropriate Requirements (ARAR)*** evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. ***Long-term Effectiveness and Permanence*** considers the ability of an alternative to maintain protection of human health and the environment over time.

4. ***Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment*** evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contaminant present.

5. ***Short-term Effectiveness*** considers the length needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during construction.

6. ***Implementability*** considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. ***Cost*** includes estimated capital and annual operation and maintenance costs, as well as present value cost. Present value cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 t0 -30 percent.

8. ***State/Support Agency Acceptance*** considers whether the State agrees with the EPA's analyses and recommendations as described in the RI/FS and Proposed Plan.

9. ***Community Acceptance*** considers whether the local community agrees with the EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

Hudson Branch Sediment Excavation – The Hudson Branch sediments would be excavated to eliminate unacceptable ecological risk, as described in Alternative 3.

COMPARATIVE ANALYSIS OF ALTERNATIVES

In this section, the alternatives are evaluated in detail to determine which would be the most effective in achieving the goals of CERCLA and the RAOs for OU2. The alternatives are compared to each other based on the nine criteria set forth in the NCP at 40 CFR 300.430(e)(9)(iii) (see box above).

Overall Protection of Human Health and the Environment

A requirement of CERCLA is that the selected remedial action be protective of human health and the environment. An alternative is protective if it reduces current and potential future risk associated with each exposure pathway at a site to acceptable levels.

Each of the alternatives evaluated for facility soils, except Alternative 1, would provide protection of human health and the environment. No risk reduction is anticipated under the "no action" alternative. Alternative 2 is more protective of human health than Alternative 1 because the deed notice would prohibit the development of the facility for residential use; however, Alternative 2 would not be sufficiently protective because it does not prevent human exposure to contaminated soils or offer protection to ecological receptors from soil or sediment contamination. Alternatives 3 and 4 are protective of human health and the environment. Alternative 3 would eliminate unacceptable risks to human health and ecological receptors through a combination of capping (facility soils), excavation (Hudson Branch sediments) and institutional controls. Alternative 4 would eliminate unacceptable risks by excavating both the facility soils and the Hudson Branch sediments, as well as institutional controls. The excavation of sediment in Alternatives 3 and 4 would cause some disruption of the Hudson Branch habitats, but the disruption would be minimized by incorporating remedial design criteria that preserve large trees, to the extent practicable, and promote sustainability and habitat

preservation.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Any alternative considered by the EPA must comply with all federal and state environmental standards, requirements, criteria or limitations, unless they are waived under certain specific conditions.

The NJDEP NRDCSRS are chemical-specific ARARs for the facility soils. There are no chemical-specific ARARs for sediments. The NJDEP surface water quality standard (SWQS) for vanadium is a chemical-specific ARAR for the surface water of Hudson Branch. The Federal Executive Order 11990: Protection of Wetlands and Federal Executive Order 11988: Floodplain Management are location-specific ARARs for the Hudson Branch portion of the site. New Jersey Administrative Code 7:26C-7.2 is an ARAR for a deed notice to be placed on the facility.

All alternatives except Alternative 1 rely on institutional controls for protectiveness and would comply with the New Jersey Administrative Code 7:26C-7.2 ARAR for the placement of a deed notice. Alternatives 1 and 2 do not achieve the chemical-specific ARARs for the facility soil. Alternative 1 also does not achieve the chemical-specific ARAR for Hudson Branch surface water. Alternative 2 would rely on natural processes and long-term monitoring to achieve and demonstrate compliance with the surface water ARAR. Location-specific ARARs do not apply to Alternative 1 and 2 because remedial actions are not implemented. Alternatives 3 and 4 comply with chemical-specific soils ARARs and the location-specific wetlands and floodplains ARARs and would eliminate exposure via capping and excavating, respectively. Alternatives 3 and 4 also comply with the surface water ARAR by removing the contaminated sediment containing the source of the vanadium and then monitoring to demonstrate compliance with the surface water ARAR.

Long-Term Effectiveness and Permanence

This evaluation takes into account the residual risk remaining at the conclusion of remedial activities, and the adequacy and reliability of containment systems and institutional controls.

Alternative 1 does not offer long-term effectiveness and permanence. Alternative 2 would provide some long-term effectiveness and permanence through the use of institutional controls to help reduce human exposure to facility soils, but would not be effective or permanent with respect to ecological receptors because contaminated soils would remain uncovered. Alternatives 3 and 4 offer long-term effectiveness and permanence through institutional controls as well as capping and excavating of facility soils, respectively, and excavating of Hudson Branch sediments.

Reduction of Toxicity, Mobility or Volume through Treatment

This criterion addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and/or significantly reduce the toxicity, mobility or volume of hazardous substances as their principal element.

Alternatives 1 and 2 would not reduce the toxicity, mobility or volume of contaminants through treatment since no treatment would occur. For Alternatives 3 and 4, a treatment technology may be applied to the excavated sediments to facilitate disposal, such as dewatering, that would reduce the mobility or volume of contaminants.

Short-Term Effectiveness

This criterion addresses the effects of each alternative during construction and implementation until RAOs are met. It considers risks to the community, on-site workers and the environment, available mitigation measures and time frame for achieving the response objectives.

Since no response actions would be implemented under Alternative 1, no short-term impacts would be anticipated due to this alternative, although

risks would remain above acceptable levels. Alternative 2 would not be effective in the short term because it would not address unacceptable ecological risk. On-site workers handling contaminated surface soil could be exposed to facility soil dust during capping (Alternative 3) and excavation (Alternative 4) activities, but the exposure would be addressed by proper use of personal protective equipment. Alternative 3 is more effective in the short term than Alternative 4 because it limits contact with contaminated soil to a greater extent than Alternative 4. Alternatives 3 and 4 are the same for the Hudson Branch sediments and thus have the same short-term effectiveness; there would be an increase in traffic along local roads for approximately 36 months and noise from heavy equipment use.

Implementability

This criterion considers the technical and administrative feasibility of implementing each alternative, including availability of services and materials needed during construction.

All alternatives are technically feasible. Since no response activities would occur under Alternative 1, it is simplest to implement. The monitoring under Alternative 2 is also readily implementable. The institutional controls under Alternatives 2, 3 and 4 are relatively easy to develop and administratively feasible. Design and implementation of capping (Alternative 3) and excavation (Alternatives 3 and 4) are administratively feasible, as no permits are required for on-site activities, although such activities would comply with substantive requirements of otherwise required permits, and construction would be performed in accordance with the ARARs.

Alternatives 3 and 4 would require truck traffic coordination through the residential neighborhoods and available landfill capacity at an off-site location. Alternatives 3 and 4 can be readily implemented from an engineering standpoint and utilize commercially available products and accessible technology.

Cost

The estimated capital costs, O&M costs and present worth costs are discussed in detail in the April 2014 feasibility study report. The present-worth costs were calculated using a discount rate and a thirty-year time interval for the post-construction monitoring and maintenance period. As can be seen from the table below, capital costs and present worth costs increase substantially from Alternative 1 through Alternative 4, whereas annual O&M costs are similar for Alternatives 2, 3 and 4.

Alter-native	Capital Cost	Annual O&M Cost	Present Worth
1	$0	$0	$0
2	$150,000	$490,000	$640,000
3	$4,900,000	$410,000	$5,310,000
4	$10,670,000	$410,000	$11,080,000

State Acceptance

The State of New Jersey is still evaluating EPA's preferred alternative as presented in this Proposed Plan.

Community Acceptance

Community acceptance of the preferred alternative will be addressed in the ROD following review of the public comments received on the Proposed Plan.

PREFERRED ALTERNATIVE

EPA's preferred alternative is Alternative 3 Capping Facility Soils, Excavating Sediments and Institutional Controls. The estimated present-worth cost of the preferred alternative is $5,310,000. The components of the preferred alternative are as follows:

- Capping the 1.3 acres vanadium- and chromium-impacted soils in the eastern storage areas that pose unacceptable risks to human health and ecological receptors.

- Establishing institutional controls in the form of deed restrictions/environmental

easements and/or restrictive covenants on future uses of the facility to ensure that residential use is prohibited and to ensure that all existing covers/caps are not disturbed (for example, should a building be removed, the former building footprint must be paved to maintain existing cover/cap).

- Maintaining the existing security measures at the site (e.g., signage and fencing).
- Maintaining the existing covers/caps.
- Excavating approximately 9,800 cubic yards of Hudson Branch sediments to a depth of 12 inches in the channel and a depth of six inches outside the channel to meet PRGs listed in the Remedial Goals section of this Proposed Plan and eliminate ecological risk. Depending on the results of the predesign investigation, an estimated 400 to 500 cubic yards of sediment may need to be excavated in the small "pond area" to meet PRGs and eliminate ecological risk in that localized area (less than half an acre).
- Backfilling the excavated areas with clean material to match the surrounding grade and restoring, as necessary.
- Monitoring surface water in the Hudson Branch for vanadium until the NJDEP surface water quality standard of 12 ug/L is met.
- Reviewing site conditions at least once every five years, as required by CERCLA.

The preferred alternative, Alternative 3, provides the best balance of trade-offs among alternatives with respect to the evaluating criteria. The EPA and NJDEP believe that the preferred alternative will be protective of human health and the environment, complies with ARARs, is cost effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

FOR FURTHER INFORMATION

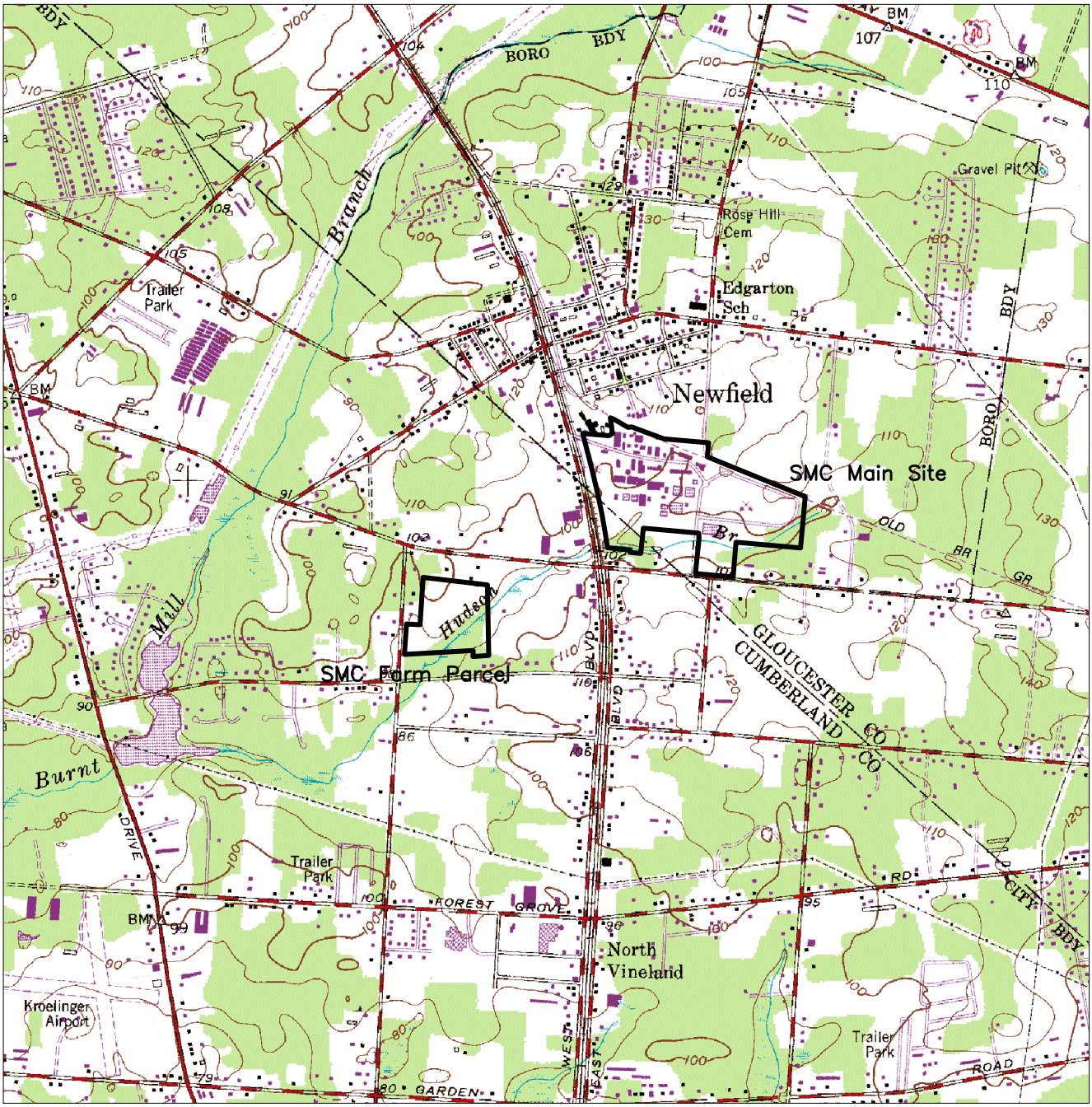
The administrative record file, which contains copies of the Proposed Plan and supporting documentation is available at the following locations:

Newfield Public Library
115 Catawba Avenue
Newfield, NJ 08344
(856) 697-0415
Hours: Mon-Thu 10:00 AM-7:00 PM, Fri 10:00 AM-5:00 PM, Sat 10:00 AM-1:00 PM

EPA Region 2, Superfund Records Center
290 Broadway, 18th Floor
New York, NY 10007-1866
(212) 637-4308
Hours: Mon – Fri, 9:00 AM-5:00 PM

In addition, select documents from the administrative record are available on-line at:

http://www.epa.gov/region02/superfund/npl/shieldalloy



SOURCE: NEWFIELD, N.J. QUADRANGLE, 1953, PHOTOREVISED 1994,
7.5 MINUTE SERIES (USGS TOPOGRAPHIC MAP)

SITE PROPERTY BOUNDARY

N

0 2000 FT.

APPROXIMATE SCALE

NEW JERSEY

QUADRANGLE LOCATION

TRC ENVIRONMENTAL CORP.
57 East Willow Street
Millburn, New Jersey 07041

SITE LOCATION MAP

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NO.: 2710ES-112434

BR/TH	DATE: SEPTEMBER 2013	FIGURE: 1

M:\CAD FILES\WORK\2710ES\2013 OU2 FS\FIGURE 1 SITE LOCATION MAP.DWG 07/19/2013 02:16:37PM TAB: LAYOUT

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SITE PLAN

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NUMBER: 112434

DATE: FEBRUARY 2013 | FIGURE: 2

JG/PZ

TRC ENVIRONMENTAL CORP.
1500 Market Street
Philadelphia, PA 19102

GRAPHIC SCALE
0 120' 240'

LEGEND

- PROPERTY LINE
- FENCE LINE
- WETLAND LIMITS
- WETLAND BUFFER
- 100 YR FLOODPLAIN*
- DELINEATED STREAM
- VEGETATIVE AREA INCLUDING GRASS, TREES AND DIRT ROADS
- FORMER PRODUCTION AREA WITH CONCRETE, ASPHALT, BUILDING SLAB, AND SOIL COVER.
- FORMER LAGOON WITH CENTERED CLEAN FILL. 98" (EXCAVATED FROM 32" TO 98" THEN BACKFILLED FROM 32" TO 98" WITH CENTERED CLEAN FILL.
- FORMER LAGOON WITH LIMITED EXCAVATION. CLEAN SOIL COVER EXTENDS TO 3' IN EXCAVATED AREAS.
- BASED ON 2010 FS IN NEWFIELD. NEW JERSEY. VANLANDT'S LAST FS WAS IN 1982 AND DID NOT CLASSIFY THE UPPER HUDSON BRANCH AS HAVING ANY 100 YR FLOOD RISK.

- NATURAL RESOURCE RESTORATION PLANTING AREAS (NOTE: THESE AREAS WERE CAPPED UNDER REGULATORY LEGAL AGREEMENTS WITH 1–2' OF CLEAN SOIL AND VEGETATION, IN 1999 AND 2001. DATA SHOWN IS BELOW THE CAP.)
- RESTRICTED AREA
- EASTERN STORAGE AREA
- FORMER LAGOONS AREA
- FORMER PRODUCTION AREA
- SOUTHERN AREA
- UNCAPPED AREA
- EXISTING BUILDING FOOTPRINT
- DEMOLISHED BUILDING FOOTPRINT
- ITEMS REMOVED/CLOSED

SOURCE:
BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.
LACROCE PROPERTY BOUNDARY BASED ON TAX MAP–CITY OF VINELAND, OCTOBER 1, 1971.
ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE, WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

W. ARBOR STREET
E. ARBOR STREET
DIVISION STREET
PROSPECT AVENUE
EAST BOULEVARD
WEYMOUTH ROAD
E WEYMOUTH
N. WEST AVENUE
HUDSON BRANCH
EXISTING DIRT ROAD
PROPERTY LINE
GLOUCESTER COUNTY
CUMBERLAND COUNTY
OPEN GARAGE
HORSE ENCLOSURE
BOARDING STATION
SHIELDALLOY METALLURGICAL CORPORATION FARM PARCEL
LACROCE PROPERTY
PAVEMENT EDGE
NORTH VINELAND CAR WASH
MEDICATION INDUSTRIES
FISCHER & PORTER
REFRACTORY GLASS
NEWFIELD BOROUGH
CITY OF VINELAND
RR TRACKS
WEST BOULEVARD
WWTP
SHIELDALLOY METALLURGICAL CORPORATION FACILITY
FORMER LAGOONS AREA
FORMER PRODUCTION AREA
CONCRETE TANK FOUNDATIONS AND PAD
NATURAL RESOURCE RESTORATION AREAS
RESTRICTED AREA
EASTERN STORAGE AREA
FORMER WOOD LINED TANK
THERMAL POND
ONSITE IMPOUNDMENT
NATURAL RESOURCE RESTORATION AREAS

SMC FACILITY

SMC FARM PARCEL

POND AREA

N
W
E
S
NJ State Grid 1983

WWTP
NEWFIELD BOROUGH
CITY OF VINELAND
WEST BOULEVARD
RR TRACKS
RESEARCH GLASS
FISCHER & PORTER
WHEATON INDUSTRIES
NORTH VINELAND CAR WASH
PAVEMENT EDGE
HUDSON BRANCH
GLOUCESTER COUNTY
CUMBERLAND COUNTY
PROPERTY LINE
WEYMOUTH ROAD
HORSE ENCLOSURE
OPEN GARAGE
PUMPING STATION
EXISTING DIRT ROAD
N. WEST AVENUE
W. ARBOR STREET
EAST BOULEVARD
LACROCE PROPERTY
DIVISION STREET
PROSPECT AVENUE

0 300' 600'
GRAPHIC SCALE

LEGEND

- PROPERTY LINE
- FENCE LINE
- DELINEATED STREAM
- POND
- WETLAND LIMITS
- EXISTING BUILDING FOOTPRINT
- EXTENTS OF HUDSON BRANCH SEDIMENT EXCEEDING PRGs (PRELIMINARY REMEDIATION GOALS)

SOURCE:

BASE MAP FROM JAMES M. STEWART, INC., LAND SURVEYORS, PHILADELPHIA, PA. AND ON-SITE OBSERVATIONS.
LACROCE PROPERTY BOUNDARY BASED ON TAX MAP-CITY OF VINELAND, OCTOBER 1, 1971.
ORTHOPHOTOS FROM NEW JERSEY IMAGE WAREHOUSE WEB SITE, PUBLISHED 7/31/2003 WITH PHOTO TAKEN IN 2002.

NOTE:

EXTENTS OF SEDIMENT CONCERNS IN HUDSON BRANCH IS BASED ON SEDIMENT DATA EXCEEDING ECOLOGICAL PRGS, SOIL BANK DATA, WETLAND LIMITS, AND LOCALIZED TOPOGRAPHY. ALSO, THE UNCAPPED AREA IS SITE SOIL EXCEEDING HUMAN HEALTH AND ECOLOGICAL PRGS FOR VANADIUM, THAT ARE NOT ALREADY CAPPED.

TRC ENVIRONMENTAL CORP.
1500 Market Street
Philadelphia, PA 19102

EXTENTS OF HUDSON BRANCH
SEDIMENTS EXCEEDING PRGs

SHIELDALLOY METALLURGICAL CORPORATION
NEWFIELD, NEW JERSEY

JOB NUMBER: 112434

MG/CG	DATE: APRIL 2014	FIGURE: 3

FILE: \\MILLBURN-FP2\DRAFTINGFILES\CAD FILES\WORK\2710ES\2014_04 OU2 REVISED FS\2014_04 PROPOSED PLAN FROM EPA\FIGURE 3- EPA PROPOSED PLA, DATE: 04/15/2014 02:43:32PM

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